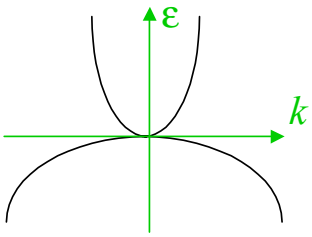
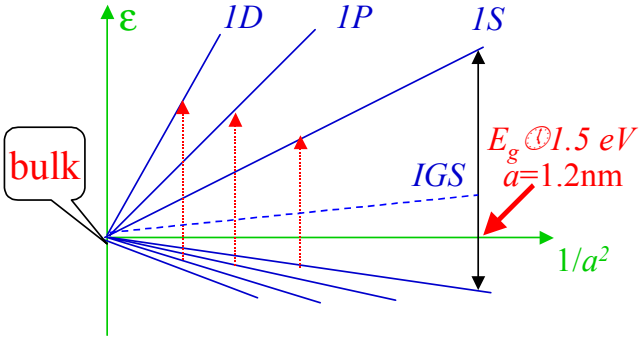
Opening of the Energy Gap in Gapless (HgTe) and Narrow Gap (InSb, HgCdTe) Nanocrystal Semiconductor Structures

Energy band structure of bulk gapless HgTe (E_g=0):



Size-dependent optical energy gap of HgTe nanocrystals (radius *a*)



The *1S, 1P, 1D* ... are the quantum size levels of electrons and holes, and *IGS* is an intrinsic gap state appearing inside the gap.

The calculations show the capability of making HgTe nanocrystal quantum dot lasers that work at 1.6 μm (a wavelength that propagates through atmosphere without absorption and scattering and is eye safe).